UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/767,281	01/30/2004	Tae-Sung Kim	P57002	4288

8439 7590 09/18/2009

ROBERT E. BUSHNELL & LAW FIRM
2029 K STREET NW
SUITE 600
WASHINGTON, DC 20006-1004

EXAMINER	
WARREN, MATTHEW E	

ART UNIT	PAPER NUMBER
2815	

MAIL DATE	DELIVERY MODE
09/18/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

RECORD OF ORAL HEARING

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TAE-SUNG KIM and KYUNG-JIN YOO

Appeal 2009-002505
Application 10/767,281
Technology Center 2800

Oral Hearing Held: August 6, 2009

Before MARC S. HOFF, CARLA M. KRIVAK and THOMAS S. HAHN, Administrative Patent Judges.

ON BEHALF OF THE APPELLANTS:

ROBERT E. BUSHNELL, ESQ.
2029 K Street, N.W., Suite 600
Washington, D.C. 20006

The above-entitled matter came on for hearing on Thursday, August 6, 2009, commencing at 2:12 p.m., at the U.S. Patent and Trademark Office, 600 Dulany Street, Alexandria, Virginia, before Jan Jablonsky, Notary Public.

JUDGE HOFF: Good afternoon. Could you state your name for the record, please?

MR. BUSHNELL: If it please the panel, my name is Robert E. Bushnell, and this application belongs to -- this would be Samsung SDI Company, Ltd.

JUDGE HOFF: You have 20 minutes. You may begin.

MR. BUSHNELL: The issues are well formed here. We identified in our background discussion the Tanaka reference. And Tanaka I believe, we said, discloses electrodes of titanium nitride, aluminum, titanium nitride, titanium aluminum, and titanium nitride and aluminum. But the difficulty with Tanaka -- this is on page 3 of our original spec -- he doesn't actually address or suggest a solution of the problem of aluminum what's called electromigration.

This is an electrical board, is that correct?

JUDGE KRIVAK: Yes.

JUDGE HOFF: Yes.

MR. BUSHNELL: Electrical panel?

JUDGE HOFF: Yes, sir.

MR. BUSHNELL: Okay. Tanaka didn't recognize the problem of pure aluminum diffusing into this semiconductor layer of a transistor during the heat treatment process. What's key here is that heat treatment process.

Now these were basically apparatus claims, except for claim 21; but it always used to bother me in criminal defense work that nobody actually ever told the Court what the facts were. They were always kind of stylized facts, and that sort of thing.

Here, heat treatment is critical, and the Applicant explains on page 2 that these problems of electro migration and high resistance, or relatively high resistance in the electrodes, affect the quality of the image formed on the screen of the display device.

So at the bottom of the paragraph 0006, they explain the heat treatment process subsequent to the formation of the metal electrode, and the conductive lines electrically connected thereto tends to worsen the metal electrode, or the quality of the metal electrode as an electrical conductor.

And then they say, "For example, the contact annealing process after source and drain metal sputtering is necessary in thin film transistor fabrication." And they suggest the temperature used to anneal may be higher than 300 degree Celsius.

Now the primary reference of Ohtani 543 doesn't really have any disclosure of a heat treatment. He's using sputtering and chemical vapor deposition processes.

And the Office, courtesy of Naval Ordinance Lab back in the '70s, is well aware of chemical vapor deposition. The semiconductor itself would be analogous to ceiling white paint on Abraham Lincoln's mother's log cabin, when Abe Lincoln used to write on it with carbon from a candle or an oil lamp.

What the trick is, the ceiling's cool relative to the chemical vapor deposition source -- so it precipitates upside down on the ceiling.

That's still true, it's always been true, whether it's upside down or visa-versa. But Richard Schooler demonstrated down at Naval Ordinance Lab, and he certainly had enough cases issued, that demonstrated you can

vary the precipitation or so forth by fooling around very gently with the temperature of the substrate.

My point is you don't subject the substrate to heat treatment, certainly not at 300 degrees, when you're doing chemical vapor deposition.

Now the Examiner's position is that -- and I'm quoting from his Examiner's Answer -- Ohtani, the primary reference, shows all of the elements of the claims except the aluminum layer being an aluminum alloy, and the diffusion prevention layer interposed between the aluminum alloy and each of the pair of titanium layers.

And then he suggests going to Maeda, the secondary reference. These two references are applied to the rejection of all claims.

In addition, Yamazaki 575 is applied for the rejection of claims 8 and 21, in order to show the complete device. We don't need to discuss Yamazaki here today.

Now, Maeda, according to the Examiner, shows in Figure 1 -- source drain electrode having titanium layer 32, aluminum alloy layer 36, and a titanium nitride layer 34 interposed between the titanium and aluminum alloy, to act as a barrier for blocking the aluminum diffusion, and also according to the Examiner for preventing growth of alloy spikes.

Now the problem with that is that there's no prima facie showing of obviousness. Under 103 we have to identify the differences. The examiner neglected to do that.

The Applicant defines basically using claim 1 as an example: "An aluminum alloy layer disposed between a pair of titanium layers and a

diffusion prevention layer interposed between the aluminum alloy layer and each of the pair of titanium layers."

At best, the Examiner is citing -- I believe he's citing columns 3 and 4 of Maeda. He has a three-layer structure.

Now why is that significant? As per line 40 of column 4 of the secondary reference, it's after annealing, the aluminum silicon layer 37 is formed on layer 34.

What's missing here, or what he's done is substitute basically a four-layer structure at best, which doesn't have an aluminum alloy layer disposed between -- a pair of titanium layers -- aluminum silicon I think we will agree is not titanium -- and he's also missing the second to the pair of diffusion prevention layers.

Third, he's actually depositing that after the annealing step --

JUDGE HAHN: Sir?

MR. BUSHNELL: Yes?

JUDGE HAHN: Excuse me. I'm following what you're saying. Could you cite to your Appeal or Reply Brief where this argument is set out? And what I am saying by argument concerns a pair of titanium layers sandwiching the aluminum layer.

MR. BUSHNELL: Okay. I can do that. And from time to time the Board asks me to do that. It does take time, and my request is you'd grant me extra time to do that.

JUDGE HOFF: Very well.

MR. BUSHNELL: Very well. Okay.

Okay. If you start, I guess on page 6 of our Brief, and include the last paragraph that spans 6 and 7 for the pair of titanium layers.

JUDGE HAHN: That's in your Summary of the Claimed Subject Matter. But in your Argument, I missed it in your Argument. I did not find that in your Argument.

MR. BUSHNELL: Well, we had to actually string together several paragraphs to regurgitate an argument, the express limitations of the claims. There had been complaints over the years that our arguments were too long, and we tried to shorten them by just focusing on the deficiencies or the differences under 103(a) that should have been considered.

But let me read one here. Okay, that's that. And if you go to the Reply Brief.

What I'm addressing here today is actually the Reply Brief to the Examiner, which raises issues that weren't raised during the prosecution. Let me go to that.

JUDGE HOFF: You mean the Examiner's Answer?

(Discussion was held off the record.)

MR. BUSHNELL: Yeah. What I'm really addressing here is page 4 of the Examiner's Answer, where we're discussing these details of the electrodes.

Yeah. Okay. On the Reply Brief, at the bottom of page 2 -- and again, remember the Board's been threatening us with a page limit on these briefs in the proposed rules, so --

JUDGE HOFF: Which is not currently in force.

MR. BUSHNELL: Well, we talk about Ohtani's three-layered laminated structure, titanium, aluminum, titanium. And then going down towards the -- wait a minute, yeah, top of page 3, and then at the bottom of page 3, even assuming that Maeda teaches the use of a seven-aluminum alloy layer instead of aluminum, at best Maeda teaches a four-layer structure.

And what he's missing is the titanium and the titanium interposed nitride. And the reason that's important is Applicant uses a heat treatment or annealing afterwards. Maeda does the heat treating or annealing before.

And you can see that better in Maeda's example. He's got a different embodiment, that he discusses on page 5 with respect to Figures 3(a) and 3(b), where he says he has the four-layer structure in which titanium silicide layer 52 is formed on top of the aluminum layer 36.

And I assume that's independent of what the composition of the aluminum layer 36 is.

And wait a minute, that's a vacuum deposition growth. So what's missing here is the recognition that downstream of that growth process, you have the problem addressed on paragraph 0006 of Applicant's original specification, heat treatment subsequent to the formation of a metal electrode, and conductive lines electrically connected thereto.

That's nowhere recognized in any of these references. There are earlier references, and it's not unexpected that these references don't have this recognition -- in view of, I guess, the annual R&D budgets of several million dollars for these processes to get the processes running perfectly.

So what we've got here are the differences that were required to be recognized by 103(a). We have to weigh those, and when we don't even have a prima facie discussion or suggestion of the structure explicitly defined by the independent claims.

But we have an advantage flowing from those differences, mainly the ability to anneal this, particularly when you're doing contact annealing processes, temperatures higher than 300 degrees Celsius, we've got indicia of patentability.

Okay. And I believe that's all we need to address today.

JUDGE HOFF: Any questions --

MR. BUSHNELL: It seems what we've got here -- and I've noticed this in other cases -- there's a thumb on the scale of obviousness, engaging obviousness. Somebody's putting their thumb on the scale and then telling the examiner "No".

I've had examiners tell me that in other cases. I haven't spoken to this Examiner. But according to the Examiner's reasoning, and the use of aluminum either as an alloy or otherwise, and any cleaving on the side of that aluminum layer with titanium and titanium nitride, negates patentability of any further tinkering with that.

Which is what inventors do. Time and again, the inventor -- sometimes I bring them in for interviews, and the examiner has one question. If we look at your number two patent and your number four patent, why wouldn't it be obvious to interchange those?

And in that case, the Examiner told me he didn't need to see any other -- because that inventor was the best in the world. The Inventor's

answer was, "I asked myself the same question. Why did it take me four years to recognize I could do this?" Get the same product, a better result by interchanging these parts from two different references of his own work.

No question they were bars they'd issued long before. But it took the inventor four years.

Here what we have is one more efforts to perfect the TFT production process.

These are big plants, they're multi-billion-dollar plants, and they locate them in different places around the world. So it's quite a significant investment.

Thank you, Your Honor.

JUDGE HOFF: Thank you.

(Whereupon, at 2:28, the proceedings were concluded.)